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○ INTRODUCTION.

This REVIEW is based on reports for December, 1890, from 2,401 regular and voluntary observers. These reports are classified as follows: 171 reports from Signal Service stations; 118 reports from United States Army post surgeons; 1,558 monthly reports from state weather service and voluntary observers; 31 reports from Canadian stations; 184 reports through the Central Pacific Railway Company; 339 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Ser-

vice;" monthly reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa Weather and Crop Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, North and South Dakota, Ohio, Oregon, Pennsylvania, Tennessee, Texas, and Wisconsin, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

○ CHARACTERISTICS OF THE WEATHER FOR DECEMBER, 1890.

The month was warmer than the average December, except over the northeast part of the country, and on the middle Pacific coast and the adjoining part of the plateau region. In the British Possessions north of Montana the mean temperature was more than 15° higher, and in the Saint Lawrence Valley and thence southward to the Maine coast it was more than 10° lower than usual. A notable feature of the month was the low temperature which prevailed over the extreme northeast part of the country, where the weather was colder than in any other section within the region of observation. The coldest weather in December commonly occurs in the extreme north-central districts. The severest cold wave of the month extended from Minnesota eastward over the Saint Lawrence Valley on the 2d, when the temperature fell below -25° in parts of Quebec, Ontario, and northwest Minnesota. On the 4th a cold wave prevailed east of the Rocky Mountains. On the 10th a warm wave extended from the Lake region to Missouri and Kansas, and thence to Manitoba. From the 19th to 22d unusually warm weather prevailed in Minnesota and the Dakotas. On the 31st one of the warmest periods on record for the season occurred in Arkansas, east Missouri, and Iowa. The highest temperature reported by a regular station of the Signal Service was 88°, at Brownsville, Tex., and by a voluntary observer, 92°, at Fort Ringgold, Tex. At stations in the middle and west Gulf states and the middle Missouri and Red River of the North valleys the maximum temperature was higher than previously reported for December. The lowest temperature reported by a regular station of the Signal Service was -27°, at Saint Vincent, Minn., and by a voluntary observer, -36°, at Orono, Me. The first killing frost of the season was reported at Monticello, Ga., on the 1st; at Little Rock, Ark., on the 4th; at Palestine, Tex., on the 8th; at Pensacola, Fla., on the 9th; at New Orleans, La., Savannah, Ga., Duke, Fla., and Red Bluff, Cal., on the 10th; at Villa City, Fla., and Charleston, S. C., on the 28th; and at Tampa, Eustis, Jacksonville, and near Titusville, Fla., on 29th.

The precipitation was deficient over a greater part of the country, the only sections in which an excess of precipitation was reported being the Canadian Maritime Provinces, southeast New England, southeast New York, Virginia, east Tennessee, west Pennsylvania, the south part of the southern

plateau, and the extreme north Pacific coast. The greatest excess above the average precipitation for December occurred on the extreme north Pacific coast, where it amounted to 7.60 inches at Neah Bay, Wash., and the excess was more than 4.00 inches at Cape Breton Island. The greatest deficiency occurred in south Alabama and south Mississippi, where it was more than 3.00 inches, and the deficiency was more than 2.00 inches along the Atlantic coast south of the 35th parallel and thence westward over the Gulf States to the 97th meridian, and on the Pacific coast between the 40th and 47th parallels. The monthly precipitation at Pittsburgh, Pa., 5.64 inches, was the heaviest ever reported at that station in December, the greatest amount previously noted for that month being 5.00 inches, in 1879. The least precipitation ever reported for December was noted in North Dakota, Minnesota, west and south Iowa, south Nebraska, and at Walla Walla, Wash. The greatest depth of snowfall, 86 inches, was reported at Blue Knob, Pa. The snowfall exceeded 70 inches along the line of the Central Pacific Railroad crossing the summit of the Sierra Nevada Mountains; 60 inches in northeast Pennsylvania; 50 inches in central New York; and 40 inches in south-central and southwest Maine, north New Hampshire, north-central Virginia, and southeast Ohio. At the close of the month over 30 inches of snow remained on the ground at points from central New York to southwest Maine, in the mountains of Pennsylvania, and in west-central lower Idaho.

Destructive gales prevailed over the Canadian Maritime Provinces on the 1st; over southeast Massachusetts on the 4th; at New York City on the 12th; at Grand Haven, Mich., on the 13th; on the Atlantic coast from North Carolina to Maine on the 17th, when great damage was caused to shipping and other property by high wind, and to seaside property by high seas; in the Lake region on the 23d, when one person was killed and several injured at Baberton, Ohio, and three persons seriously injured at Detroit, Mich., by falling buildings; on the north Pacific coast and in west Montana on the 25th, when considerable damage was caused to shipping, railroad, and other property; along the middle Atlantic and New England coasts on the 26th, when many disasters to shipping occurred; and in north Texas on the 31st. On the 8th a storm which presented the characteristics of a tornado passed over

Jersey, Walton Co., Ga., killing one person, and damaging buildings to the extent of about \$500. Severe thunder-storms were reported at Pensacola, Fla., on the 3d; in northwest Louisiana on the 5th; and at Dadeville, Mo., on the 31st. Navigation was reported closed for the season on the Great Lakes at Marquette, Mich., on the 3d; at Duluth, Minn., and Green Bay, Wis., on the 4th; at Milwaukee, Wis., on the 5th; at Sandusky, Ohio, on the 6th; at Buffalo, N. Y., and Alpena, Mich., on the 8th; at Cleveland, Ohio, on the 9th; at Oswego, N. Y., on the 13th; and at Port Huron, Mich., on the 25th. Rivers were reported closed by ice as follows: Androscoggin and Penobscot rivers, Me., on the 1st; upper Hudson river on the 3d; Schuylkill River frozen at Philadelphia on the 3d;

Detroit River on the 12th; Connecticut River on the 16th; Monongahela River at Morgantown, W. Va., on the 28th, and at Greensborough, Pa., on the 29th; the Susquehanna River at intervals at Wilkes Barre, Pa. The Mississippi River was frozen over at Red Wing, Minn., on the 2d; Lake Pepin the night of the 2-3d; and the river at Dubuque, Iowa, on the 4th. The Missouri River was closed at Fort Buford, N. Dak., the night of the 3d-4th; and at Fort Yates and Fort Sully, S. Dak., on the 6th. On the 2d water was drawn from the Erie Canal west of Little Falls, N. Y., and on the 18th the Morris Canal, New Jersey, closed for the season. Drought prevailed in parts of Illinois, Missouri, Iowa, Louisiana, Texas, Montana, and Oregon.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for December, 1890, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart II by isobars. The departure of the mean pressure for December, 1890, obtained from observations taken twice daily at the hours named, from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Duluth, Minn.	+ .001	Saint Louis, Mo.	-.000
Detroit, Mich.	+ .004	Memphis, Tenn.	-.001
Buffalo, N. Y.	+ .005	Cincinnati, Ohio.	-.002
Chicago, Ill.	+ .007	Galveston, Tex.	-.002
Philadelphia, Pa.	+ .007	Denver, Colo.	-.003
New Orleans, La.	+ .008	Fort Assiniboine, Mont.	-.006
Eastport, Me.	+ .009	Salt Lake City, Utah.	-.007
New York City.	+ .010	Santa Fé, N. Mex.	-.010
Washington City.	+ .010	San Francisco, Cal.	-.014
Savannah, Ga.	+ .011	Portland, Oregon.	-.016
Boston, Mass.	+ .015	San Diego, Cal.	-.016

The mean pressure was highest within an area which extended from north Nevada over Utah to west Colorado, where it was 30.25, whence it decreased eastward to below 29.80 at Cape Breton Island, Canadian Maritime Province, southeastward to about 30.20 in the east and west Gulf states, southward and southwestward to below 30.10 over the extreme southwest part of the plateau region and on the south Pacific coast, westward to below 30.15 on the middle Pacific coast, and northwestward and northward to below 29.95 on the extreme north Pacific coast and in the British Possessions north of Washington, Idaho, and west Montana.

A comparison of the pressure chart for December with that of the preceding month shows that there was a general increase in the mean pressure in the east and west Gulf states, the Mississippi, Ohio, and Saint Lawrence valleys, the Lake region, over the southern plateau, and on the middle and south Pacific coasts; elsewhere the mean pressure was lower than for November. The greatest increase in mean pressure occurred in the middle Saint Lawrence valley and northeast Ontario, and over extreme south Florida, where it exceeded .10, and the most marked decrease in mean pressure occurred on the extreme north Pacific coast, where it exceeded .20. The area of high pressure which covered the middle and northern plateau regions in November contracted and in December occupied a part of the middle plateau. Over the Canadian Maritime Provinces, where the mean pressure for November was lowest, there was a decrease of about .10.

The mean pressure was above the normal, except in the Atlantic coast states from Georgia northward, over the northern part of the country from Lake Superior westward to the north Pacific coast, and on the extreme south Pacific coast. The greatest departures above the normal pressure occurred from the east part of the middle plateau region southeastward to the west Gulf coast, where they exceeded .05, and the most marked departures below the normal pressure were noted over east Nova Scotia and Cape Breton Island, where they exceeded

.10. In the British Possessions north of Minnesota, North Dakota, and Montana the departures below the normal pressure exceeded .05.

The monthly barometric ranges at regular stations of the Signal Service are shown in the table of Signal Service data on the last two pages of the REVIEW.

AREAS OF HIGH PRESSURE.

I.—Appeared in Manitoba on the 1st and moved along the extreme northern limit of the United States, reaching the Gulf of Saint Lawrence on the 3d. The temperature fell 10° to 20° over the Northern States on the 1st, and a further fall of 6° to 10° occurred on the 2d.

II.—First appeared north of Montana on the 2d, moved southeastward to Missouri, eastward to Cape Hatteras, and thence southward to northern Florida. A second rise in pressure, following and combining with the increased pressure accompanying number II, produced a high area whose centre was in the Saint Lawrence Valley on the 5th. The temperature fell 10° to 20° in the Ohio and lower Mississippi valleys on the 3d, and 10° in the middle and south Atlantic states on the 4th.

III.—This high area was central in Montana on the 5th, in the Missouri Valley on the 6th, and north of Lake Ontario on the 7th. The pressure on the 5th increased 0.50 inch in Colorado, and the temperature fell 10° to 18° in that state and Arkansas. The area of increased pressure on the 6th included the upper lake region, the upper Mississippi and Missouri valleys, and the southwest. The temperature fell over the same area, the greatest fall being in northern Texas, where it was 15° to 22° on the 7th. There was a fall of 10° in temperature over the Lake region, New England, and the middle Atlantic states. Following the centre of number III was a second centre of high pressure, which formed a part of the same general wave of high barometer that extended from British America to the Gulf of Mexico. On the 7th it caused a further fall of temperature in Texas and Louisiana; and on the 8th a fall of 20° to 30° in the east Gulf states.

IV.—The centre of this high area is traced from British Northwest Territory to Kansas, and thence eastward to North Carolina. Its motion was then to the northwest and it was in Ohio on the 14th, on the 15th in the Saint Lawrence Valley, and on the 16th over Nova Scotia. A fall of 10° to 20° in temperature preceded the centre of the high, reaching the Atlantic coast on the 12th. The southern position of the high on the 13th and 14th, in connection with low area VIII, caused a rise in temperature in the Atlantic coast states on those days. The subsequent movement of the high caused a decided fall of temperature in New England and the middle Atlantic states on the 15th and 16th, the greatest fall being 30° in Vermont on the 16th.

V.—An area of high barometer appeared on the California coast on the 14th. It moved east and southeast to extreme southern Texas, and thence northeast to Cape Hatteras; at this point it united with a high area that started in Manitoba